

# Nuclear Division

Saturday, 21 June 2014 3:43 PM

## Mitosis

*Explain the importance of mitosis in growth, repair and asexual reproduction.*

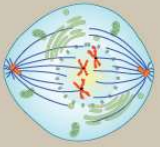
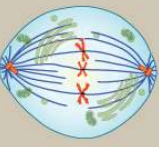
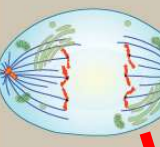
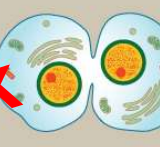
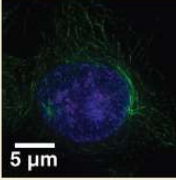
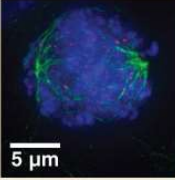
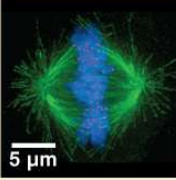
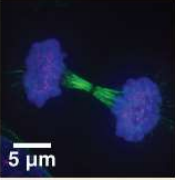
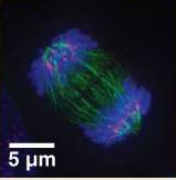
Mitosis results in the formation of two genetically identical daughter cells, a characteristic that is crucial for growth and repair of an organism and asexual reproduction

Need for daughter cells to be genetically identical to parent cell, and hence be able to carry out the same functions as the parent cell to ensure survival of organism

*Explain the need for the production of genetically identical cells and fine control of replication.*

Mitosis ensures that the **two daughter nuclei formed** contained **genetically identical sets of genetic material** as the parent nucleus, with the **same number of chromosomes** and the **same genetic make-up**. This is to ensure the **daughter cells will be genetically identical to the parent cell**. This maintains the **genetic stability** of an organism.

*Describe with the aid of diagrams, the behaviour of chromosomes during the mitotic cell cycle and the associated behaviour of the nuclear envelope, cell membrane and centrioles. (Names of the main stages are expected)*

| Prophase                                                                                                                                                                                                                                     | Prometaphase                                                                                                                                                                                    | Metaphase                                                                                                                                                                                       | Anaphase                                                                                                                                                                                                                     | Telophase                                                                                                                                                                                                                                                                         | Cytokinesis                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                            |                                                                                                               |                                                                                                               |                                                                                                                                           |                                                                                                                                                                                               |                                                                                                                               |
| <ul style="list-style-type: none"> <li>Chromosomes condense and become visible</li> <li>Spindle fibers emerge from the centrosomes</li> <li>Nuclear envelope begins to break down</li> <li>Centrosomes move toward opposite poles</li> </ul> | <ul style="list-style-type: none"> <li>Chromosomes continue to condense</li> <li>Kinetochores appear at the centromeres</li> <li>Mitotic spindle microtubules attach to kinetochores</li> </ul> | <ul style="list-style-type: none"> <li>Chromosomes are lined up at the metaphase plate</li> <li>Each sister chromatid is attached to a spindle fiber originating from opposite poles</li> </ul> | <ul style="list-style-type: none"> <li>Centromeres split into two</li> <li>Sister chromatids (now called chromosomes) are pulled toward opposite poles</li> <li>Certain spindle fibers begin to elongate the cell</li> </ul> | <ul style="list-style-type: none"> <li>Chromosomes arrive at opposite poles and begin to decondense</li> <li>Nuclear envelope material surrounds each set of chromosomes</li> <li>The mitotic spindle breaks down</li> <li>Spindle fibers continue to push poles apart</li> </ul> | <ul style="list-style-type: none"> <li>Animal cells: a cleavage furrow separates the daughter cells</li> <li>Plant cells: a cell plate, the precursor to a new cell wall, separates the daughter cells</li> </ul> |
|                                                                                                                                                           |                                                                                                              |                                                                                                              |                                                                                                                                          |                                                                                                                                                                                              |                                                                                                                              |

MITOSIS

## Meiosis

*Explain what is meant by homologous pairs of chromosomes.*

A homologous pair of chromosomes are any two chromosomes that determine the same characteristics in an organism. They are of the same size with centromeres at the same position with identical sequences of loci, and pair with each other during Prophase I of meiosis.